

# Improving Care for Patients With Diabetes at a Rural Primary Care Clinic by Empowering Licensed Nursing Assistants With a Flow Sheet Tool

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Chronic diseases such as diabetes are among the leading causes of illness, disability, and death in the United States, affecting nearly half of the population. They account for the majority of health care expenses.<sup>1</sup> Most of the expense from diabetes is from micro- and macrovascular complications such as heart attacks, kidney disease, and eye disease.<sup>2,3</sup> Evidence-based measures that can prevent and slow the progression of these complications are summarized in the American Diabetes Association clinical practice guidelines.<sup>4</sup> Studies have shown that health care providers routinely fail to follow these recommended guidelines for patients with diabetes, fulfilling all recommended guidelines only 45% of the time.<sup>5</sup> Further studies have found that this failure frequently results from inadequate systems to support health care delivery for chronic conditions.<sup>6</sup>

## Problem and Purpose

The Dartmouth-Hitchcock Lyme Clinic is an extension of the Section of General Internal Medicine at Dartmouth-Hitchcock Medical Center in Lyme, N.H. It has a patient population of 4,500. The clinic specializes in adult preventive care and the management of common, complex, and chronic medical conditions. Diabetes affects 8–10% of the clinic population and is its sixth most common diagnosis group. At baseline, only 73% of patients with diabetes visiting the clinic were receiving

pneumococcal vaccinations, and 16% were receiving foot exams.

The global aim of the effort described here was to redesign the routine care received by patients with diabetes at the Dartmouth-Hitchcock Lyme Clinic to make the care more evidence-based and reliable. There were two specific aims: 1) to identify all patients with diabetes every time they visit the clinic and 2) to improve performance and documentation of recommended process measures. The clinic's licensed nursing assistants (LNAs) and physicians were primarily engaged in this improvement initiative, which was the first clinic-wide improvement project at the Dartmouth-Hitchcock Lyme Clinic.

## Interventions and Measures

The team of providers and LNAs assessed the gaps in care by walking through the process of an office visit. Key leverage points were identified, such as notifying providers of care needed that day, engaging frontline workers in the completion of the care, and creating a system to ensure documentation.

Through dialogues in meetings, it was decided to first identify all patients with diabetes who had a scheduled appointment. The LNAs generated this list every clinic day using the hospital database. A flow sheet was designed that listed the last dates of all required routine care for a patient with diabetes (such

as last date of A1C testing and last date of foot exam). Flow sheets were completed by an LNA each day for scheduled patients with diabetes. The flow sheets prompted LNAs and providers to address needed care. Documentation of the day's care was then entered into the electronic medical record by an LNA. Results and ongoing plans were displayed on a dashboard in the staff lounge and discussed during staff meetings. These changes occurred over the course of a year from February 2007 to February 2008.

To track improvement, the clinic focused on both process and outcome measures. Data were obtained monthly from the Hitchcock Data Reporting System (HDRS), a database of patient measures based on coding and documentation in the computerized information system flow sheets. The team followed rates of pneumococcal and influenza vaccinations, foot exams, eye exams, A1C testing, and LDL and blood pressure control.

Data were obtained monthly from HDRS reports from February 2007 until April 2008. Results were analyzed bimonthly using statistical control charts created in SPC XL 2000 (SigmaZone.com, Windermere, Fla.).

P-charts were used because the measures are attribute data, meaning that they are "not quantified on an infinitely divisible numeric scale."<sup>7</sup> Control limits were set

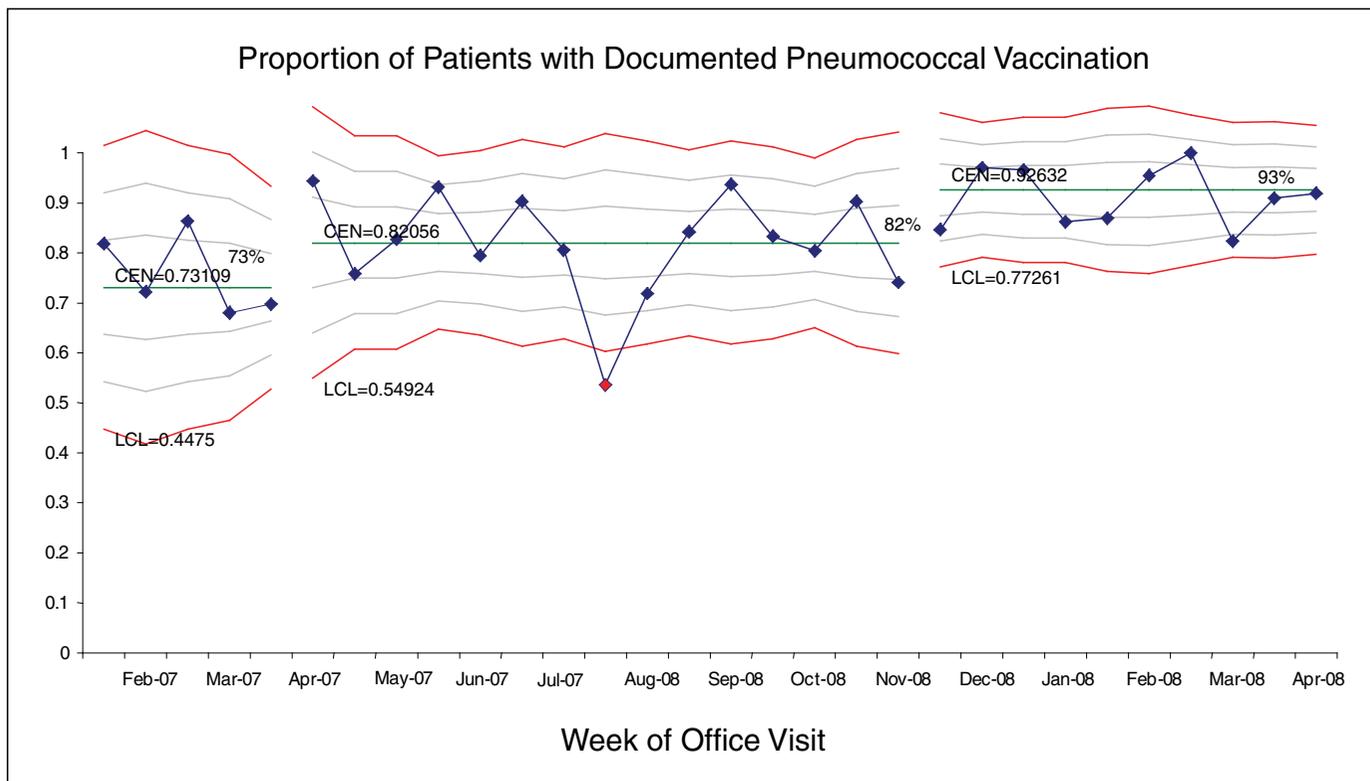


Figure 1. P-chart representing the proportion of patients with diabetes who were seen and received their pneumococcal vaccination. The blue line shows actual data. The green line (center line) shows the average for a given period. The gray lines represent 1-sigma and 2-sigma levels from average. The red lines represent upper and lower control limits; these are not shown if they are above 1.0 or below 0. CEN, center line; LCL, lower control limits

at 3-sigma; this is equivalent to  $P < 0.01$ . Special cause variation was assessed when four of five successive points were on the same side of the central line and more than one sigma unit away.<sup>8</sup>

**Results**

From February 2007 until February 2008, 789 patients with diabetes visited the Lyme Clinic. Statistical process control charts showed special cause variation with an increase in the percentage of pneumococcal vaccinations from 73% at baseline to 93% after the intervention (Figure 1). Foot exams increased from 16 to 65% (Figure 2).

Outcome measures also showed improvement with special cause variation in diabetes control (percentage of patients having an A1C < 7.0%) and lipid control (percentage of

patients having an LDL cholesterol reading of < 130 mg/dl) (Table 1).

These changes engaged the LNAs in chronic disease management. Patients were more likely to have evidence-based care provided to them during visits. A major challenge was staff turnover, which was addressed by making management of the flow sheets a part of the LNA job description. Because of the success achieved

with this work, the Department of Medicine created a new position to oversee the management of chronic diseases. This position has promoted dissemination of the process change to other clinics.

**Discussion**

Researchers in this study targeted a population of diabetic patients seen in a primary care clinic. The goal was to increase performance and

Table 1. Changes in Blood Glucose and LDL Cholesterol Outcomes		
Measure*	Percentage below target value	
	Baseline (2007)	1-Year (2008)
Blood glucose control (A1C < 7.0%)	53%	62%**
Cholesterol control (LDL < 130 mg/dl)	80%	86%**
*Both measures displayed special cause variation in p-chart analysis (charts not shown). **P < 0.05 for 1-year compared to baseline.		

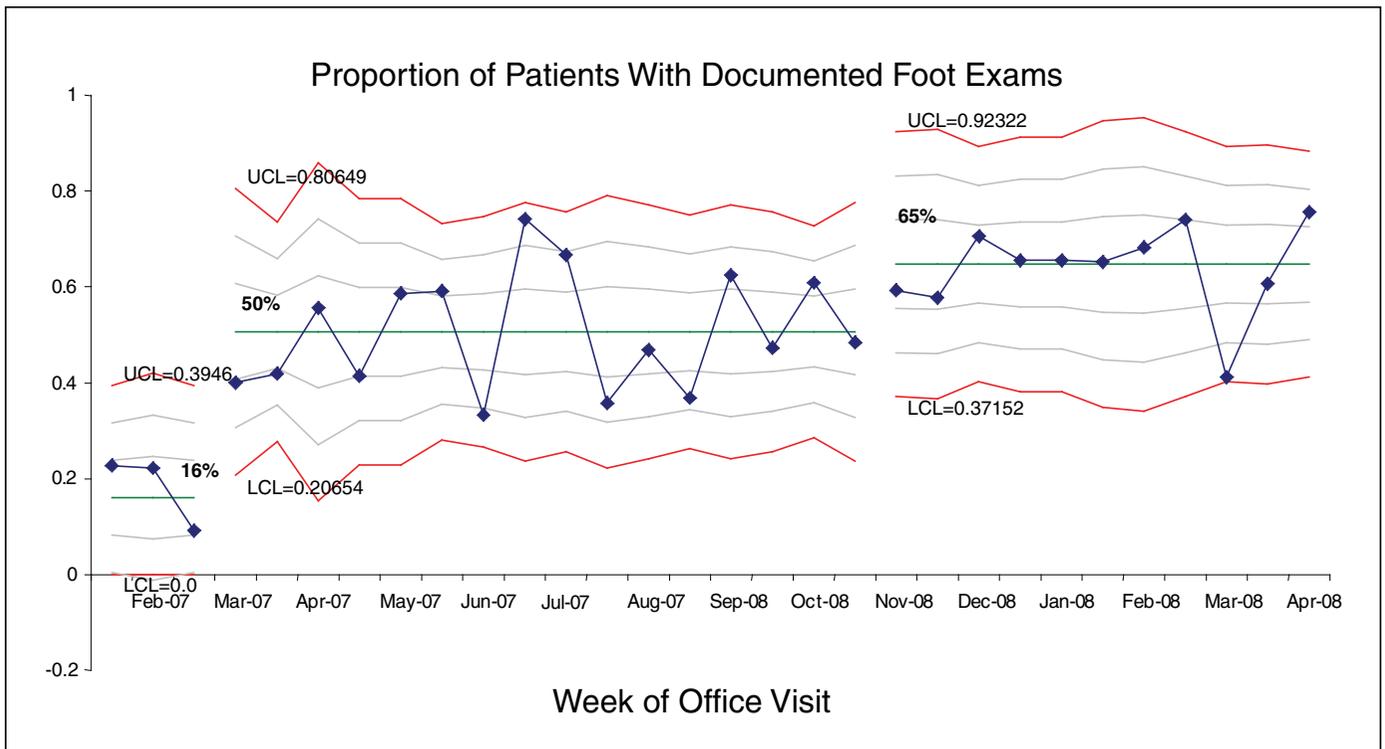


Figure 2. P-chart representing the proportion of patients with diabetes who were seen and had a documented foot exam within the past year. The blue line shows actual data. The green line (center line) shows the average for a given period. The gray lines represent 1-sigma and 2-sigma levels from average. The red lines represent upper and lower control limits; these are not shown if they are above 1.0 or below 0. LCL, lower control limit; UCL, upper control limit

documentation of process measures. The clinic did this through increasing awareness of its baseline performance and a redesign of the process with a flow sheet tool that engaged the LNAs at the frontlines of patient care.

The literature suggests that chronic diseases such as diabetes are best addressed using the Chronic Care Model. This model focuses on producing informed, activated patients interacting with prepared, proactive practice teams through self-management support, clinical information systems, delivery system redesign, decision support, health care organization, and community resources to improve the care of patients with chronic diseases.<sup>9,10</sup> This initiative focused on empowering LNAs and integrating a flow sheet tool with the computerized information system.

The literature demonstrates that use of a flow sheet tool can improve performance and documentation of diabetes care.<sup>11,12</sup> It has been shown that practices that improve the care of diabetes have several characteristics in common, namely, that physicians or nurses feel personally involved, that monitoring care is viewed as positive work, and that plans address barriers to care.<sup>13</sup> The Lyme Clinic initiative has several of these characteristics, including LNA involvement and an acceptance of the value of monitoring work.

This study provides further evidence that process redesign can create positive change in the care of patients with chronic diseases. The team learned from increasing awareness and some simple process changes that it could improve.

### Limitations

With regard to internal validity, the team notes that this study did not have a control group. Instead, improvements were determined from comparisons to baseline data. Furthermore, the identification of patients with diabetes, the targeted population, was based on coding and not on clinical data, possibly resulting in incorrect labeling of some patients. The data reporting system had a significant time delay between actual care and reporting, thus leading to potential reporting errors. In addition, the clinic serves a well-educated and relatively affluent population in northern New England. Therefore, the reproducibility of the intervention may not be possible for sites with a greater number of uninsured or less well-educated patients. There is a high probability that the gains achieved through this initiative could weaken

over time. This effect was actually observed when the project champion was on a leave of absence and also during times of staff turnover.

### Summary

Use of a flow sheet and ownership by frontline providers such as LNAs was an effective way to ensure completion of evidence-based care for patients with diabetes in this initiative. Sustainability was achieved by anchoring the process change into daily work flow and into the clinic culture. Increasing the role of LNAs to address simple aspects of patient care may give providers more flexibility and time to address patients' more complex care needs.

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